

**TECHNICAL NOTE 1      Howes Lane, Bicester**

**Proposed Interim Scheme Assessments**

**Project No. A098025**

Version 1: Draft

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# 1 Introduction

- 1.1.1 Oxfordshire County Council (OCC) have commissioned WYG to assess the impact of development in Bicester on the proposed Howes Lane/Bucknell Lane signalised junction.
- 1.1.2 The junction proposal has been tabled by P3Eco to accommodate initial phases of the North West Bicester development area to be constructed prior to construction of a new tunnel under the railway near to this location.
- 1.1.3 OCC require information on the trigger point at which the interim scheme can no longer accommodate traffic growth in the area and construction of the new tunnel would be required.

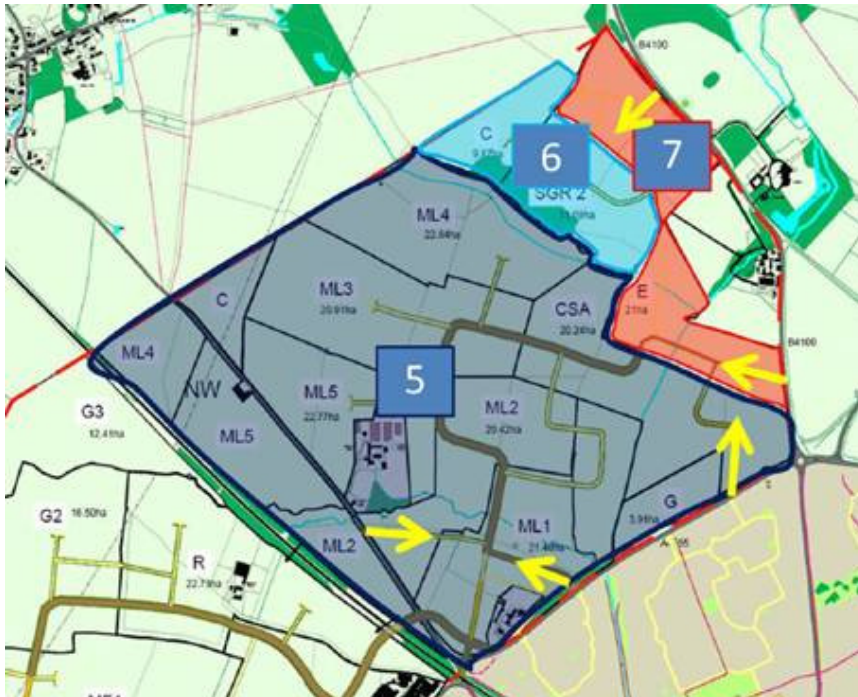
## 1.2 BACKGROUND

- 1.2.1 The North West Bicester development proposals consist of a mixed use site including residential units, schools, B1 Office Business Park / Eco Business Centre, B2/B8 Industrial Units/Storage and Distribution and local facilities.
- 1.2.1 The developments above were aggregated into the zone areas shown in **Figures 1 and 2** below for input to the traffic model:

**Figure 1: Southern Zones**



**Figure 2: Northern Zones**



1.2.2 The interim scheme was set up to accommodate 2024 forecast traffic flows from the Bicester Saturn model. LINSIG assessments were carried out by P3Eco demonstrating that the interim scheme could accommodate the 2024 level of traffic growth which included 1700 dwellings at Himley Village (Zone 1).

1.2.3 However, although the 2024 traffic forecasts aided development of a scheme, the forecasts needed further refinement due to the following:

- i) The traffic model was not validated for turning movements;
- ii) The background traffic counts used to develop the model were collected prior to significant highway changes in the area including prior to the construction of Vendee Drive;
- iii) Development assumptions for the NW Bicester site were assumed as a percentage across each zone due to lack of further information at the time rather than specific numbers of dwellings or areas for employment in set zones;
- iv) The forecasts were derived prior to Upper Heyford gaining planning permission and hence this was not included in the 2024 forecasts; and
- v) Reassignment of traffic flows away from congested areas occurs in a model resulting in any flows extracted for a congested junction to be lower than the

'desire line' flows through the junction that may need to be accommodated. This is the case for flows reassigning onto Kingsley Road in the model to avoid the Howes Lane junction.

1.2.4 Since carrying out the initial assessment using the 2024 flows, further traffic count information for 2016 has become available.

1.2.5 Analysis of the counts indicated that, significantly, the count information had similar levels of traffic using the Lords Lane approach in 2016 as the model scenario predicted for 2024 which lead to the concern that the model was potentially under representing the demand on this link. Therefore, OCC requested that a series of tests be carried out using the most up to date count information to provide additional information on the operation of the junction.

## 2 Traffic Forecast Derivation

### 2.1 2016 TRAFFIC COUNT INFORMATION

2.1.1 2016 traffic surveys were commissioned by Oxfordshire County Council (OCC) in June 2016. These included a classified turning count (CTC) at the Bucknell Road/Lords Lane junction. The CTC's were carried out on Wednesday 15<sup>th</sup> June over a 12 hour period from 7am to 7pm. Analysis of the count was carried out against ATC data at the same location to ensure that the day of survey was considered representative of local traffic conditions.

2.1.2 An additional count was carried out at the Bucknell Road/ Howes Lane junction on Thursday 11<sup>th</sup> August. This survey date falls within the school holiday period. Analysis of the count data showed that the survey was consistent with the count carried out at the Bucknell Road/Lords Lane junction directly to the north although the traffic flows in the AM peak were seen to be slightly lower than the June survey.

2.1.3 The two traffic counts were converted to Passenger Car Units (PCU) and combined to provide data in a matrix format for input into a LINSIG assessment.

### 2.2 DEVELOPMENT INFORMATION

2.2.1 Traffic flows have been extracted from the 2031 Bicester Transport Model for the following zones using select link analysis:

- NW Bicester Zones 1-6 by zone independently
- NW Bicester Exemplar (Zone 7)
- Graven Hill (GH)
- SW Bicester (SWB)
- Wretchwick Green (WG)
- Upper Heyford new development (UH)
- Bicester 4 Employment Site
- Bicester 10 Employment Site
- Bicester 11 Employment Site

2.2.2 These flows have been tabulated by development in order that each can be scaled separately in order to allow a range of scenarios to be tested.

2.2.3 It is acknowledged that, in some cases, double counting may occur as flows from one of these new zones may go to one of the others in the list above but this makes for a robust assessment and the volume of such flows is limited.

## 2.3 NW BICESTER DEVELOPMENT ASSUMPTIONS

2.3.1 Traffic forecasts by zone for the NW Bicester site were derived by Hyder Consulting acting as transport consultant for the developer at the time of modelling and information on the number of dwellings/size of employment area in each zone was not supplied to WYG at the time or at any subsequent time prior to this assessment. Therefore, in order to carry out further assessments, it was necessary to derive zone size assumptions based on the trip numbers supplied for each zone and known trip production/attraction patterns.

2.3.2 The development assumptions by zone are given below:

Zone 1: Himley Village: 1700

Zone 2: Residential ~ 150 dwellings + Employment (51400 sqm) (Albion Land)

Zone 3: Residential ~ 150 dwellings + Employment (4100 sqm)

Zone 4: Residential ~ 1150 dwellings + Employment (4100 sqm)

Zone 5: Residential ~ 2207 dwellings + Employment (5800 sqm) (Includes 500 dwellings for Application 1)

Zone 6: Residential ~ 250 dwellings

Zone 7: Exemplar = 393 dwellings

2.3.3 In the absence of further information, it has been assumed that the residential and employment elements internal to each zone are built out at the same rate.

### 3 Scenario Testing

3.1.1 As discussed above, each of the zonal trip data detailed above has been tabulated to allow a percentage to be applied independently for any development. The resultant flows are then added to the 2016 count data to provide development phasing scenarios. All flows are in PCUs.

3.1.2 The LINSIG models as provided by P3Eco were updated to include the scenarios and then traffic signal timings optimised with no adjustments made to other Linsig model parameters (such as phasing, intergreen times etc). The supplied LINSIG included a 'Scenario 5a' as derived by the developer.

3.1.3 Initial scenarios to be tested are detailed below (See **Appendix A** for tabulated percentage assumptions):

- i) 2016 Counted Flows;
- ii) Scenario 1: 2016 plus all development zones at 100%;
- iii) Scenario 2: 2016 plus 100% on NWB zones 1 and 2, 23% on Z5, 100% on Exemplar and the equivalent 2024 percentage for the other developments based on the 2024 tables of development supplied by OCC;
- iv) Scenario 3: 2016 plus 2024 assumption for NWB as above but including only the committed developments not the allocated sites;
- v) Scenario 4: 2016 plus 2024 assumption for NWB in isolation; and
- vi) Scenario 5: 2016 plus committed development.

3.1.1 Practical Reserve Capacity (PRC) is used as a measure of junction performance. Ideally, for a junction or network to be considered to be working, the PRC should be greater than zero and represents a junction working within the 85% capacity level used for link or junction assessments. In practice, junctions with PRC values of between 0 and -11% can be considered to operate within acceptable levels as this corresponds to up to 100% of capacity although some queuing and delay will occur within this 0% to -11% range.

3.1.2 The Practical Reserve Capacity summary table from the Linsig for each scenario is given below:

**Table 1: Initial LINSIG Assessment Results**

<b>PRC %</b>	<b>AM</b>	<b>PM</b>
Scenario 5a (2021)	18.6	-0.1
2016	22.8	29.4
Sc1	-58.6	-62.8
Sc2	-58.8	-49.8
Sc3	-46.5	-32.3
Sc4	7.3	13.5
Sc5	-41.7	-34.3

- 3.1.3 As can be seen from the table above, the LINSIG predicts that the interim scheme can operate well based on the 2016 traffic flows. However, this is not the case for Scenarios 1-3 with PRC well outside the acceptable range. Therefore, it can be concluded that the interim scheme is not suitable as a final scheme for NW Bicester (as would be expected) but is also not suitable in 2024 for the assumed level of development at NW Bicester when combined with either the committed or allocated volume of developments in the area.
- 3.1.4 When no other developments are assumed (either committed or allocated), the Linsig operates within capacity in both peak periods with the morning peak worse than the 'Scenario 5a' as presented by Himley Village but with a good PRC and the PM operating better.
- 3.1.5 Scenario 5 was assessed to see if the junction would already be predicted as over capacity in 2024 based on the 2016 counts and committed developments only without NW Bicester. This assumes that Upper Heyford and SW Bicester are fully built out by 2024 which is likely to be an over estimation of the development program. This indicates that the interim scheme does not operate within capacity by 2024 with neither peak period operating within acceptable levels of capacity.
- 3.1.6 Based on the above, a further two scenarios were tested that assumed a steady build out of SW Bicester and UH between 2017 and 2031. This is not fully accurate as SWB Phase 1 is partially complete but it gives a good basis for further analysis. Assuming a linear build out from 2017 to 2031, this gives both UH and SWB at 50% complete by 2024. See **Appendix A** for tabulated percentage assumptions.
- 3.1.7 The results from Scenario 6 gives PRC results of -23.0 and -15.3, which are still outside of what is considered acceptable. (See **Table 2** below for full Scenario results).



- 3.1.8 Using the linear assumption detailed above, an additional set of flows were derived for 2022 which assumes NWB Application 1 and Himley Village are also built out linearly between 2017 and 2024 giving the number of houses on Application 1 as 362 and Himley Village as 1214. (See **Appendix A** for tabulated percentage assumptions).
- 3.1.9 The results from the LINSIG assessment give PRC's of -9.3 and -6.7. Although these are not positive values, they can be considered to be within acceptable limits as discussed above. As such a 2022 forecast year is considered the upper end of the build out period that would be acceptable before the interim scheme is no longer able to accommodate additional development growth.
- 3.1.10 Therefore, based on the updated 2016 count information, the Interim scheme proposed for the Himley Village development can be considered acceptable only if:
- no other development comes forward in the area, which is unlikely to happen; or
  - up until 2022 based on committed developments only (were the other committed developments in the area to build out at a similar linear rate).
- 3.1.11 Based on further discussions with OCC, a number of additional scenarios were also tested with different background assumptions in order to provide a full picture of possible future scenarios.
- 3.1.12 These were:
- i) Scenario 8: As Scenario 7 (2022) but with Zone 2 (Albion Land) and Application 1 (500 dwellings) at agreed levels of development;
  - ii) Scenario 9: As Scenario 8 (with Zone 2 (Albion Land) and Application 1 (500 dwellings) at agreed levels of development) but other developments scaled to 2021;
  - iii) Scenario 10: Revised background assumptions considered the most likely scenario by 2024;
  - iv) Scenario 11: As Sc10 but with Himley Village (only) reduced to assumed 2022 levels;
  - v) Scenario 12: As Sc10 but with Himley Village (only) reduced to assumed 2020 levels; and

vi) Scenario 13: As Sc10 but with Himley Village (only) reduced to assumed 2019 levels.

3.1.13 Percentage assumptions for the above scenarios are presented in **Appendix A**.

3.1.14 Results from each of the scenarios are given in **Table 2** below:

**Table 2: Full LINSIG Assessment Results**

<b>PRC %</b>	<b>AM</b>	<b>PM</b>
Scenario 5a (2021)	18.6	-0.1
2016	22.8	29.4
Sc1	-58.6	-62.8
Sc2	-58.8	-49.8
Sc3	-46.5	-32.3
Sc4	7.3	13.5
Sc5	-41.7	-34.3
Sc6	-23.0	-15.3
Sc7	-9.3	-6.7
Sc8	-11.1	-7.5
Sc9	-9.7	-2.4
Sc10	-13.6	-12.0
Sc11	-11.3	-11.8
Sc12	-10.2	-11.2
Sc13	-8.6	-11.0

3.1.15 As can be seen from the above table, using the lower levels of background development but with agreed levels of Albion Land and Application 1 development from Scenarios 8 and 9, the junction is at capacity by 2022 and close to capacity in 2021.

3.1.16 For the 'most likely' background development scenarios, the junction operates within acceptable capacity at 2019 but is over capacity after this. The 2019 assumption is equivalent to 485 dwellings at Himley Village.

3.1.17 It should be noted that all of the above assessments use a 120 second cycle time. This cycle time is often considered the maximum cycle time that is acceptable on street. However, in general, lower cycle times are desirable with values in the order of 90 seconds considered a good target. If pedestrian crossing facilities are to be provided, this target is further reduced to a 60 second cycle time. The reduction in cycle time has a corresponding reduction in overall junction PRC%. A final test was carried out on the Scenario 13 flows using a 90 second cycle time. This gave PRC% of -16.2 and -16.3 for the AM and PM respectively which are outside of the acceptable

levels. Therefore, it could be concluded that the Interim scheme would not be able to accommodate the 485 dwellings assumed for 2019.

- 3.1.18 Based on this assessment, considering the short timescale that the Interim scheme would be on the ground before alternative highway improvements would be required it is therefore considered that the Interim scheme is unlikely to offer sufficient benefits to allow development to commence. Therefore, the full scheme of a new tunnel under the railway should be provided at the earliest opportunity.

# Appendix A: Development Percentage Assumptions

**Scenario 1**

Z1	100%
Z2	100%
Z3	100%
Z4	100%
Z5	100%
Z6	100%
Exemplar	100%
GH	100%
SWB	100%
WG	100%
UH	100%
Bic4	100%
Bic 10	100%
Bic 11	100%

**Scenario 2**

Z1	100%
Z2	100%
Z3	0%
Z4	0%
Z5	23%
Z6	0%
Exemplar	100%
GH	67%
SWB	89%
WG	73%
UH	100%
Bic4	100%
Bic 10	100%
Bic 11	100%

**Scenario 3**

Z1	100%
Z2	100%
Z3	0%
Z4	0%
Z5	23%
Z6	0%
Exemplar	100%
GH	0%
SWB	100%
WG	0%
UH	100%
Bic4	100%
Bic 10	100%
Bic 11	0%

**Scenario 4**

Z1	100%
Z2	100%
Z3	0%
Z4	0%
Z5	23%
Z6	0%
Exemplar	100%
GH	0%
SWB	0%
WG	0%
UH	0%
Bic4	0%
Bic 10	0%
Bic 11	0%

**Scenario 5**

Z1	0%
Z2	0%
Z3	0%
Z4	0%
Z5	0%
Z6	0%
Exemplar	100%
GH	0%
SWB	100%
WG	0%
UH	100%
Bic4	0%
Bic 10	0%
Bic 11	0%

**Scenario 6**

Z1	100%
Z2	100%
Z3	0%
Z4	0%
Z5	23%
Z6	0%
Exemplar	100%
GH	0%
SWB	50%
WG	0%
UH	50%
Bic4	0%
Bic 10	0%
Bic 11	0%

**Scenario 7**

Z1	71%
Z2	71%
Z3	0%
Z4	0%
Z5	16%
Z6	0%
Exemplar	100%
GH	0%
SWB	36%
WG	0%
UH	36%
Bic4	0%
Bic 10	0%
Bic 11	0%

**Scenario 8**

Z1	71%
Z2	100%
Z3	0%
Z4	0%
Z5	23%
Z6	0%
Exemplar	100%
GH	0%
SWB	36%
WG	0%
UH	36%
Bic4	0%
Bic 10	0%
Bic 11	0%

**Scenario 9**

Z1	57%
Z2	100%
Z3	0%
Z4	0%
Z5	23%
Z6	0%
Exemplar	100%
GH	0%
SWB	29%
WG	0%
UH	29%
Bic4	0%
Bic 10	0%
Bic 11	0%

**Scenario 10**

Z1	100%
Z2	50%
Z3	0%
Z4	0%
Z5	23%
Z6	0%
Exemplar	100%
GH	30%
SWB	90%
WG	30%
UH	30%
Bic4	50%
Bic 10	0%
Bic 11	100%

**Scenario 11**

Z1	71%
Z2	50%
Z3	0%
Z4	0%
Z5	23%
Z6	0%
Exemplar	100%
GH	30%
SWB	90%
WG	30%
UH	30%
Bic4	50%
Bic 10	0%
Bic 11	100%

**Scenario 12**

Z1	43%
Z2	50%
Z3	0%
Z4	0%
Z5	23%
Z6	0%
Exemplar	100%
GH	30%
SWB	90%
WG	30%
UH	30%
Bic4	50%
Bic 10	0%
Bic 11	100%

**Scenario 13**

Z1	29%
Z2	50%
Z3	0%
Z4	0%
Z5	23%
Z6	0%
Exemplar	100%
GH	30%
SWB	90%
WG	30%
UH	30%
Bic4	50%
Bic 10	0%
Bic 11	100%